



## *Soils Technical Report*

# **MONTANA STATEWIDE OIL AND GAS ENVIRONMENTAL IMPACT STATEMENT AND AMENDMENT OF THE POWDER RIVER AND BILLINGS RESOURCE MANAGEMENT PLANS**

Prepared for:  
**U.S. DEPARTMENT OF INTERIOR  
BUREAU OF LAND MANAGEMENT  
MILES CITY FIELD OFFICE  
111 Garryowen Road  
Miles City, MT 59301**

June 2001

This Technical Report has been prepared for the Bureau of Land Management (BLM) by ALL Consulting (Tulsa, Oklahoma) and subcontractor CH2M HILL (Boise, Idaho) in accordance with applicable contracting requirements specific to ALL Consulting's Purchase Order with the BLM and General Services Administration (GSA) contract for Environmental Advisory Services.



# TABLE OF CONTENTS

<b>CHAPTER 1: INTRODUCTION .....</b>	<b>1-1</b>
1.1 Background.....	1-1
1.2 Regulatory Responsibilities .....	1-2
1.3 Study Area Focus .....	1-2
1.4 Purpose.....	1-2
 <b>CHAPTER 2: CBM WATER, SOILS, AND CROP CHARACTERIZATION .....</b>	 <b>2-1</b>
2.1 CBM Water .....	2-1
2.2 Soils .....	2-1
2.3 Crops and Vegetation .....	2-3
 <b>CHAPTER 3: POTENTIAL IMPACTS OF CBM WATER USE .....</b>	 <b>3-1</b>
3.1 Agricultural Impacts .....	3-1
3.1.1 Agricultural Irrigation.....	3-1
3.1.2 Livestock Water.....	3-2
3.2 Other Impacts .....	3-2
 <b>CHAPTER 4: IMPACT ANALYSIS .....</b>	 <b>4-1</b>
4.1 Agricultural Impacts .....	4-1
4.1.1 Agricultural Irrigation.....	4-1
4.1.2 Livestock Watering .....	4-3
4.2 Other Impacts .....	4-4
 <b>CHAPTER 5: FINDINGS .....</b>	 <b>5-1</b>
5.1 Agricultural Irrigation .....	5-1
5.2 Surface Water Discharge .....	5-1
5.3 Livestock Watering.....	5-2
5.4 Other Impacts .....	5-2
 <b>CHAPTER 6: REFERENCES .....</b>	 <b>6-1</b>

## CONTENTS

### **Exhibits**

- 1 RFD CMB Development
- 2 CBM Water Characteristics
- 3 Comparison of CBM and Tongue River Water Quality Characteristics
- 4 Agricultural Land Use Billings RMP Area
- 5 Agricultural Land Use Powder River RMP Area
- 6 Principal Crops in Study Area
- 7 Relationship Between Relative Crop Yield and Irrigation Water Salinity for Six Sample Crops
- 8 General CBM Water Quality Relative to the Potential for Dispersion of Soil Aggregates and Reductions In Soil Rate of Infiltration

### **Appendixes**

- A STATSGO Data for Montana Soils
- B Selected Ag Notes from Montana State University Extension Service

## ACRONYMS

ac-ft/day	acre-feet per day
ALL	ALL Consulting
BLM	Bureau of Land Management
CBM	Coalbed Methane
cfs	cubic feet per second
dS/m	deciSiemens per meter
EC	Electrical Conductivity
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
gpm	gallons per minute
GSA	General Services Administration
MBOGC	Montana Board of Oil and Gas Conservation
mcf/day	million cubic feet per day
MDEQ	Montana Department of Environmental Quality
mg/L	milligrams per liter
mmhos/cm	millihos per centimeter
MPDES	Montana Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
NEPA	National Environmental Policy Act
PRB	Powder River Basin
RFD	Reasonable Foreseeable Development
RMA	Resource Management Area
RMP	Resource Management Plan
SAR	Sodium Adsorption Ratio
STATSGO	State Soil Geographic Database
TDS	Total Dissolved Solids
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
WSAL	Wildlife Spatial Analysis Lab